WHAT IS CLAIMED IS:

- 1 1. A method of etching a multi-layer film, comprising:
- 2 etching a plurality of layers according to etching parameters;
- determining a plurality of optical characteristics each associated with one of said plurality
- 4 of layers and determined during said etching of said associated one of said plurality of layers;
- 5 and
- determining dynamic etch progressions each based on one of said plurality of optical
- 7 characteristics that is associated with a particular one of said plurality of layers undergoing said
- 8 etching.
- 1 2. The method as recited in Claim 1 further comprising comparing said optical
- 2 characteristics to detect differences therein and dynamically adjusting said etching parameters
- according to said differences.
- 1 3. The method as recited in Claim 1 wherein at least two of said plurality of optical
- 2 characteristics are substantially similar.
- 1 4. The method as recited in Claim 1 further comprising determining a plurality of refractive
- 2 indices each associated with one of said plurality of layers, wherein each of said dynamic etch
- 3 progressions is further based on one of said plurality of refractive indices that is associated with
- 4 said particular one of said plurality of layers undergoing said etching.
- 1 5. The method as recited in Claim 1 wherein said determining said dynamic etch
- 2 progressions is further based on an elapsed etch time.

1	6.	The method as recited in Claim 1 wherein said etching includes one selected from the
2	group	consisting of:
3		dry plasma etching;
4		chemical-vapor-deposition;
5		sputter deposition;
6		thermal deposition;
7		evaporation; and
8		physical vapor transport.
1	7.	The method as recited in Claim 1 wherein said plurality of layers includes at least three
2	layers.	
1	8.	The method as recited in Claim 1 wherein at least one of said plurality of layers
2	compr	ises one selected from the group consisting of:
. 3		fluorosilicate glass;
4	+ I	undoped silicon glass;
5		phosphosilicate glass; and
6		silicon nitride.
1	9.	The method as recited in Claim 1 wherein said determining said plurality of optical
2	charac	eteristics includes collecting interference signals reflected from said particular one of said
3	plural	ity of layers undergoing said etching.

- 1 10. The method as recited in Claim 9 wherein said determining said plurality of optical
- 2 characteristics includes analyzing said interference signals to determine a frequency of said
- 3 associated one of said plurality of layers.
- 1 11. The method as recited in Claim 10 wherein said analyzing includes performing a Fast
- 2 Fourier Transform.
- 1 12. The method as recited in Claim 1 wherein said etching removes portions of said plurality
- 2 of layers.

- 1 13. A method of manufacturing a microelectronic device, comprising:
- 2 providing a substrate having a first layer located on a surface thereof and a second layer
- 3 located on said first layer;
- determining a first etch rate by identifying a first optical characteristic of said first layer
- 5 by interferometry;
- 6 etching to a first target etch depth based on said first etch rate;
- determining a second etch rate by identifying a second optical characteristic of said
- 8 second layer by interferometry; and
- 9 etching to a second target etch depth based on said second etch rate.
- 1 14. The method as recited in Claim 13 wherein said etching to said first target etch depth
- 2 continues until said second optical characteristic is identified, at which time said etching to said
- 3 second target etch depth begins.
- 1 15. The method as recited in Claim 13 wherein said first target etch depth is further based on
- a first refractive index of said first layer and wherein said second target etch depth is further
- 3 based on a second refractive index of said second layer.
- 1 16. The method as recited in Claim 13 wherein said first target etch depth is further based on
- a first elapsed etch time and wherein said second target etch depth is further based on a second
- 3 elapsed etch time.
- 1 17. The method as recited in Claim 13 wherein at least one of said etching to said first and
- 2 second target etch depths includes one selected from the group consisting of:
- dry plasma etching;

- 4 chemical-vapor-deposition;
- 5 sputter deposition;
- 6 thermal deposition;
- 7 evaporation; and
- 8 physical vapor transport.
- 1 18. The method as recited in Claim 13 wherein at least one of said first and second layers
- 2 comprises one selected from the group consisting of:
- 3 fluorosilicate glass;
- 4 undoped silicon glass;
- 5 phosphosilicate glass; and
- 6 silicon nitride.
- 1 19. The method as recited in Claim 13 wherein said identifying said first optical
- 2 characteristic includes collecting first interference signals reflected from said first layer during
- said etching to said first target etch depth and wherein said identifying said second optical
- 4 characteristic includes collecting second interference signals reflected from said second layer
- 5 during said etching to said second target etch depth.
- 1 20. The method as recited in Claim 19 wherein said first optical characteristic is a first
- 2 frequency determined by analyzing said first interference signals and said second optical
- 3 characteristic is a second frequency determined by analyzing said second interference signals.
- 1 21. The method as recited in Claim 20 wherein at least one of said analyzing said first and
- 2 second interference signals includes performing a Fast Fourier Transform.

22. An etching system, comprising:

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- 2 means for controlling irradiation of an etching section of a target film, said target film
- 3 including a plurality of layers having varying optical characteristics;
- 4 means for detecting optical signals reflected from a surface of an exposed one of a
- 5 plurality of layers in said etching section;
- 6 means for analyzing said optical signals to determine a frequency of said exposed one of
- 7 said plurality of layers; and
- means for detecting a change in said frequency, wherein said controlling means are
- 9 configured to dynamically adapt to said change to modify parameters of said irradiation.